

tensive data on 44 radio-tagged nestlings from 1987 to 1991 and supplemented these data with intensive observations of nestlings at 2 nests in 1991 in north Florida. Fledgling eagles (birds prior to their initial migration) remained dependent on adults for food and stayed at or near the natal nest until they initiated migration at an average of 7 (4–11) weeks post-fledging. However, by 3 weeks post-fledging, they had ranged outside of the 229 m primary protection zone used in Florida. Of greater importance is the extent of the protection period which currently ends when young fledge. It should extend until fledglings initiate migration away from the natal area. Disturbance near a nest while fledglings still are dependent on adults may cause premature dispersal of young from the nesting area prior to their attaining adequate food reserves for migration. Fledglings in less than optimum physical condition when initiating migration may be less likely to survive the energetic demands of migration. Lowest survival occurred during the first summer of life (63%) shortly after initiation of migration, indicating the importance of fledglings being in good physical condition when they leave the nest area. Timing of migration appeared to relate to food availability and likely, physical condition; most fledglings left the study area while fish abundance was declining. First-hatched birds tended to migrate at a younger age than second-hatched birds. Since the older sibling generally dominated in food conflicts, it could achieve the physical condition necessary for migration more quickly. The younger sibling in two-chick nests also had significantly lower survival (59% vs. 71%) through the first year of life. Prey deliveries decreased at one nest after the older sibling had migrated. Perhaps if young do not leave on their own, food deliveries are decreased by adults, possibly in response to declining prey availability.

ELECTROCUTION MORTALITY OF GOLDEN AND BALD EAGLES IN AN AREA OF HIGH PREY CONCENTRATION

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We monitored prey abundance, eagle abundance, and eagle mortality in an agricultural valley in northern California from 1986 to 1992. The distribution of eagles within the study area was divided spatially and temporally through the use of two resource systems: 1) blacktailed jackrabbits in sagesteppe habitats during winter and 2) Belding ground squirrels in alfalfa fields during spring and early summer. Eagle concentration during February through May ranged from 4 to 18 eagles per square mile and often exceeded 16 eagles per square mile in areas of alfalfa cultivation. Transect surveys under power distribution lines detected from 4 to 22 eagle carcasses per year in areas of eagle concentration. Initial attempts to retrofit powerpoles to raptorproof standards were largely unsuccessful at preventing mortalities, probably due to the extremely high

use of powerpoles by eagles foraging in alfalfa fields. Secondary modifications to poles in eagle habitat will be discussed.

POSSIBLE FOOD-RELATED EARLY BREEDING OF TWO-YEAR-OLD NORTHERN GOSHAWKS IN SHRUB-STEPPE HABITATS OF NORTHEASTERN NEVADA

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Northern goshawks normally breed at three years of age. In 1992, 22 pairs of goshawks were found nesting in shrub-steppe habitats in northeastern Nevada that consisted of approximately 10% aspen (*Populus tremuloides*) forest. Members of each pair were trapped, color-banded, and aged in the hand. Of these 22 pairs, 11 consisted of mature males mated with two-year-old females. Productivity of adult/adult and adult/two-year-old pairs averaged 3.0 and 2.54 young per pair, respectively. Despite the fact that two-year-old females were as productive as adult females (t-test $P = 0.25$), their dates of fledging young were later (means of June 28 vs. July 5, $P < 0.01$), and more variable (SDs of 5.1 vs. 2.5, $P = 0.038$). These two-year-old females may have begun breeding early because of an abundance of ground squirrels (*Spermophilus beldingi*) in 1992. Blind observations at eight nests showed that breeding goshawks of all ages preyed almost exclusively on these ground squirrels until July when young were approaching fledging age. At this time, estivation of ground squirrels and the increasing abundance of recently fledged young of various species of birds may have caused the shift from ground squirrels to birds such as northern flickers (*Colaptes auratus*), robins (*Turdus migratorius*), and black-billed magpies (*Pica pica*).

POSTER PRESENTATIONS

AN ALTERNATIVE TRAPPING METHOD FOR BURROWING OWLS

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In order to trap a large population of Burrowing Owls within a short period (two weeks), a trapping method incorporating a one-way door surrounded by a wire mesh cage was used at a construction site in Manteca, California in July 1992, and at a site in Santa Clara, California in August 1991. Wire cages (2' × 2') were placed over burrow entrances with one-way doors that allowed owls to exit burrows and enter the trap. Traps were set at occupied burrows and monitored at hourly intervals. At a Manteca site on 14 July, six owls were captured at three trap sites during a time span of two hours and fifteen minutes (2015–2231). On 16 July, three owls were captured at two trap

sites (two owls in one trap) during a time span of four hours (1715–2115). At a Mission College construction site in Santa Clara, California, two owls were caught at one trap during a one hour and twenty-three minute time span (2042–2205) on 7 August. The following day, two owls were captured at two trap sites during a two hour and fifteen minute time span (2300–0115). The ease of constructing and setting the trap, the potentially high capture rate, and the lack of trapping injuries allow the one-way door trap to be used as an alternative to Bal-chatri, noose carpets, and padded leg-hold traps.

DIRECTIONS AND PRIORITIES FOR RAPTOR RESEARCH IN THE WESTERN UNITED STATES

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We initiated an assessment of the priorities of potential research directions to furnish a framework that would help guide future research on western raptors. We solicited input by means of a survey of opinions sent to a representative sample of established raptor specialists throughout North America. A total of 27 responses was received and summarized. Most respondents to our survey favored emphasizing priority research on the species of most critical conservation need rather than on essential general research questions. Specifically, participants advocated that research efforts be focused on declining species and species of unknown status. On the basis of recommendations received and review of the literature, we classified all western raptors into one of three priority categories. Species that were ranked in the highest priority category include the California Condor, Northern Goshawk, Ferruginous Hawk, Golden Eagle, Northern Pygmy-Owl, Mexican Spotted Owl, Boreal Owl, and Ferruginous Pygmy Owl. Based on the survey results and our own familiarity with the state of raptor research, we classified 15 general research topics into one of three priority categories. The respondents to our survey overwhelmingly identified three topics that should receive greatest research emphasis: 1) develop accurate monitoring techniques, 2) monitor population numbers, and 3) determine habitat affinities and needs. Finally, we ranked the priority of several specific topics related to developing reliable monitoring techniques. Of foremost importance is research designed to determine the validity and sensitivity of various existing and proposed monitoring approaches. We suggest that current and future studies that involve both species and research topics in the highest priority categories will likely represent significant contributions to the understanding and conservation of western raptors.

BEHAVIORAL INTERACTIONS WITHIN A BREEDING PAIR AND OFFSPRING OF MISSISSIPPI KITES (*ICTINIA MISSISSIPPIENSIS*)

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A single Mississippi Kite (*Ictinia mississippiensis*) nest with two nestlings was studied from hatching to fledging. Six nestling behaviors are examined in relation to days or weeks from hatching. Parental care was carried out by both parents throughout the nestling period. The male provided more food to both nestlings than did the female. Nestlings consumed similar amounts of food over the duration of the nestling period. Allopreening, setting the nest, and working the nest were observed among the nestlings. Intra-nestling aggression occurred with the younger chick exhibiting almost as many aggressive pecks against the older chick as vice versa. These data suggest that the Mississippi Kite's, and perhaps other kites', pattern of parental care and nestling behaviors may be quite different from that of other raptors.

FIRE SUPPRESSION AND MANAGEMENT OF SPOTTED OWL HABITAT IN THE WENATCHEE NATIONAL FOREST

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Historically, fire was the most significant disturbance factor in the mixed-conifer forests of the east slope of the Cascade Mountains in Washington. Prior to fire suppression, low-intensity ground fires generally occurred at intervals of less than 50 years across much of the landscape in this region. These short fire intervals prevented the establishment of fire avoiders such as grand fir (*Abies grandis*). During the recent period of fire suppression, a much longer fire interval has influenced stand structure and species composition, resulting in forest stand conditions suitable for occupancy by Spotted Owls (*Strix occidentalis*). Concomitantly, suppression of frequent, low intensity fires has enhanced conditions for stand-replacement fire by increasing fuel accumulations and continuity. In the Wenatchee National Forest (WNF), Spotted Owls appear to nest exclusively in forests naturally regenerated following fires of varying intensity and magnitude. About half of the known Spotted Owl nests occur in even-aged stands 65–135 years old. Most of these stands are dominated by Douglas-fir (*Pseudotsuga menziesii*), although grand fir is present at nearly all sites and typically ranks second in terms of tree abundance and basal area. In addition, 23% of the nest sites had been partially harvested, apparently several decades prior to our study. Priority fire protection has been recommended for sensitive forest habits